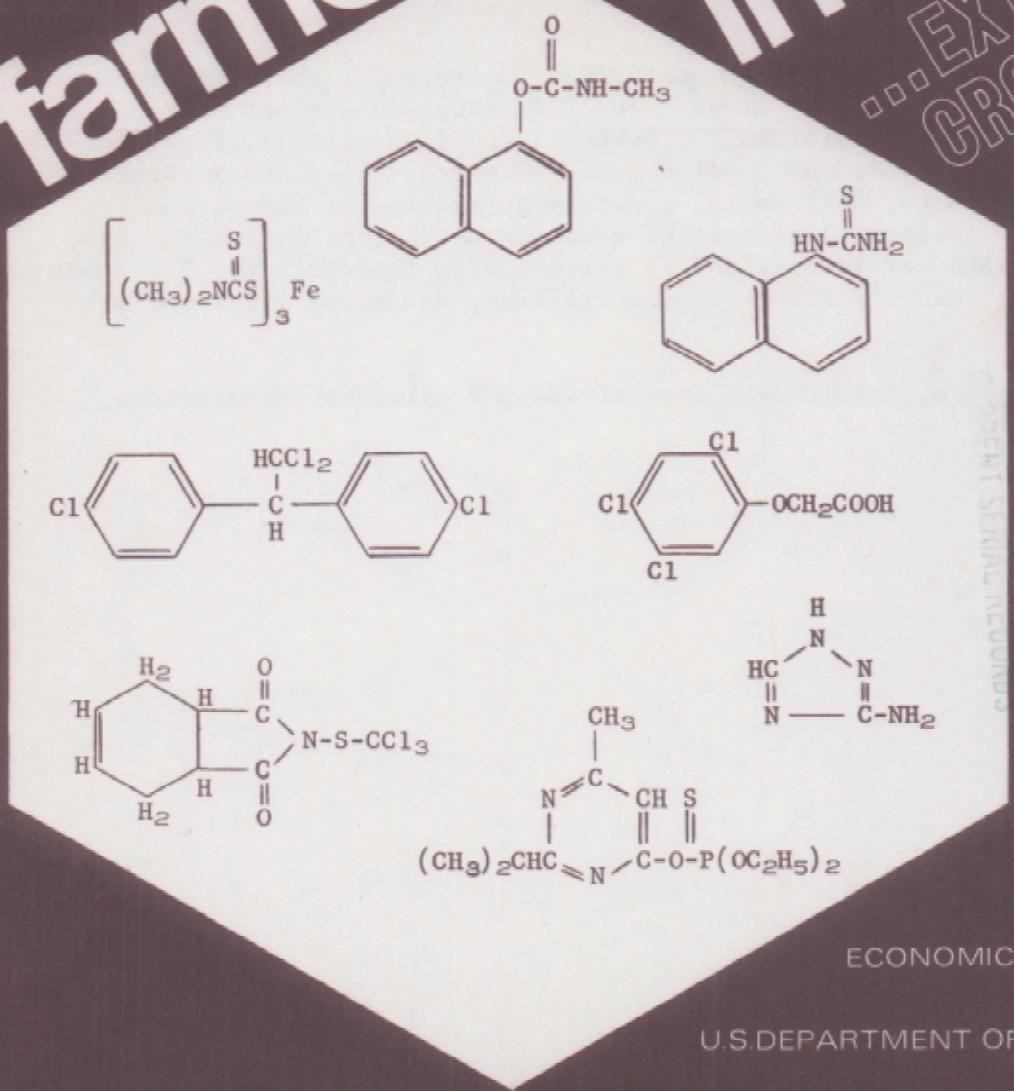
farmers' use of pesticides in 1971

...EXTENT OF CROP USE



ECONOMIC RESEARCH SERVICE

U.S.DEPARTMENT OF AGRICULTURE

AGRICULTURAL ECONOMIC REPORT No. 268

Farmers' Use of Pesticides in 1971...Extent of Crop Use. By Paul A. Andrilenas, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 268.

ABSTRACT

Over half of all U.S. farmers use pesticides to control crop pests on about 50 percent of their cropland acres. In 1971, about 45 percent of the farmers growing crops used herbicides, 26 percent used insecticides, 6 percent used fungicides, 2 percent used nematocides, and 10 percent used other pesticides (including defoliants, desiccants, growth regulators, miticides, and rodenticides). Farmers treated 41 percent of cropland acres (not including pasture and rangeland) with herbicides, and 15 percent with insecticides, 2 percent with fungicides, less than 1 percent with nematocides, and about 1 percent with other pesticides.

Key words: Pesticide use, Herbicides, Insecticides, Fungicides, Nematocides, Crops.

Washington, D.C. 20250 September 1975

PREFACE

In 1964, the Congress authorized an expanded research program on the use of pesticides in agriculture. One phase of this program was a periodic farm survey to obtain information on the use of pesticides in different areas and on different crops and classes of livestock. These data were to provide a basis for estimating the costs and benefits of pesticides and to serve as a measure of changes in pesticide use.

To meet this need for information, the Economic Research Service (ERS) obtained in early 1972 its third measure of the extent of pesticide use by farmers. The information on pesticide use for 1971 was gained as a part of the Statistical Reporting Service's (SRS) 1971 Farm Production Expenditure Survey.

The Standards and Research Division of the Statistical Reporting Service designed the nationwide sample from which farmers were selected for interview. The Data Collection Branch of SRS helped develop the final format of the pesticide use sections in the Farm Production Expenditure Survey questionnaire. The Data Collection Branch also supervised collection of the data through their State offices.

Although the Farm Production Expenditure Survey is conducted annually, the pesticide use sections are included once every 5 years, approximately. Thus, they will next be included probably in 1977.

Special acknowledgement is made to my colleagues, Herman Delvo, Theodore Eichers, and Helen Blake, of the Inputs and Finance Program Area, National Economic Analysis Division, ERS, who assisted in making a quality check on the research data. Special acknowledgement is also made to Larry Otto and Douglas Westenhaver of the ADP group, Commodity Economics Division, ERS, who developed and operated the data processing system that tabulated the data.

Further, we are indebted to the thousands of farmers who provided the data collected in the 1971 Farm Production Expenditure Survey. Without their interest and cooperation, this publication would not be possible.

This is the second of several reports to be published on farm use of pesticides in 1971. Farmers' Use of Pesticides in 1971...Quantities, Agricultural Economic Report No. 252, was published in July 1974.

CONTENTS

SUMMARY

Over half of all U.S. farmers use pesticides--weed, insect, or disease control chemicals-- on over 50 percent of their cropland acreage. In 1971, latest year with full data available, about 45 percent of the farmers growing crops used herbicides, 26 percent used insecticides, 6 percent used fungicides, 2 percent used nematocides, and 10 percent used other pesticides (including defoliants, desiccants, growth regulators, miticides, and rodenticides).

The proportion of crop acreage treated with pesticides increased substantially from 1966 to 1971. Herbicides (weed control chemicals) contributed the most to the increase with a 61-percent jump in number of acres treated. About 41 percent of all cropland (excluding pasture and rangeland) was treated with these chemicals in 1971, and over three-fourths of the cotton, corn, rice, and peanut acreage received applications.

Farmers treated about 15 percent of their cropland (excluding pasture) with insecticides in 1971--the most extensively on tobacco, peanuts, fruits, and vegetables. The biggest percentage gains in use from 1966 to 1971 occurred in cotton production and in the production of three crops considered minor users--wheat, sorghum, and soybeans. Use on cotton went from 54 to 61 percent; wheat, 2-7 percent; sorghum, 2-39 percent; and soybeans, 4-8 percent.

Fungicides were used on only 2 percent of all crop acreage. However, about 85 percent of the peanut acreage was treated with these disease control chemicals. Farmers also used fungicides on a large proportion of the fruit and vegetable acreage.

Similarly, less than 1 percent of the crop acreage was treated with nematocides. About a fourth of the tobacco acres and less than 10 percent of the peanut acres were treated. Less than 5 percent of the acres of the other crops received nematocide applications.

Extensive use of other pesticides was limited to certain selected crops. About 85 percent of the tobacco was treated with plant growth regulators to control suckers. Defoliants and desiccants were used on about a third of all cotton. Specific growth regulators were used on citrus and apples to control fruit setting and to aid in their harvest.

The proportion of crop acres treated with herbicides, insecticides, or fungicides was greater for farms with annual agricultural sales of $40,000 or more compared with farms with annual sales of $2,500 or less. These large farms treated about half their crop acres with herbicides; the small farms treated 15 percent. Insecticides were used on 32 percent of the acres on large farms, but only 4 percent on the small farms. For fungicides, about 4 percent of the acres on large farms was involved, and less than 2 percent on small farms.

FARMERS' USE OF PESTICIDES IN 1971-EXTENT OF CROP USE

BY

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INTRODUCTION

This report shows percentages of farmers using pesticides for weed, insect, disease, nematode, and other control purposes as well as percentages of acres treated. The extent of pesticide use is presented by type of pest control by crop, and size of farm. The following pesticides are considered:

Herbicides --chemicals used to kill or inhibit the growth of plants

Insecticides --chemicals used to kill or inhibit insects and fumigants used to treat soil organisms

Fungicides --chemical compounds used for disease control that kill or inhibit fungi

Nematocides --materials, often soil fumigants, used to control nematodes infesting roots of crop plants

Other pesticides --defoliants and desiccants, chemicals used as harvesting aids; growth regulators, chemicals used to influence the plant growth process; miticides, chemicals used to kill mites; and rodenticides, preparations intended to control rodents.

METHODOLOGY

Findings in this report are based on an enumerative survey of about 8,600 farmers for the 1971 crop year in 394 counties throughout the 48 contiguous States and Hawaii (fig. 1). The information on pesticide use was gathered as a part of a nationwide survey conducted by the Statistical Reporting Service that obtained farmers' production expenditures for 1971. The interviews provided detailed information on extent of use, pesticide costs, and quantities of specific chemicals used for treating growing crops, stored crops, livestock, and buildings used to store crops and house livestock.

Selection of farmers for interview was based on a two-stage multiple frame sample designed to represent all U.S. farms. The first stage of sampling consisted of selecting counties or groups of counties. These formed the primary sampling units. The second involved selecting farms within each primary sampling unit.

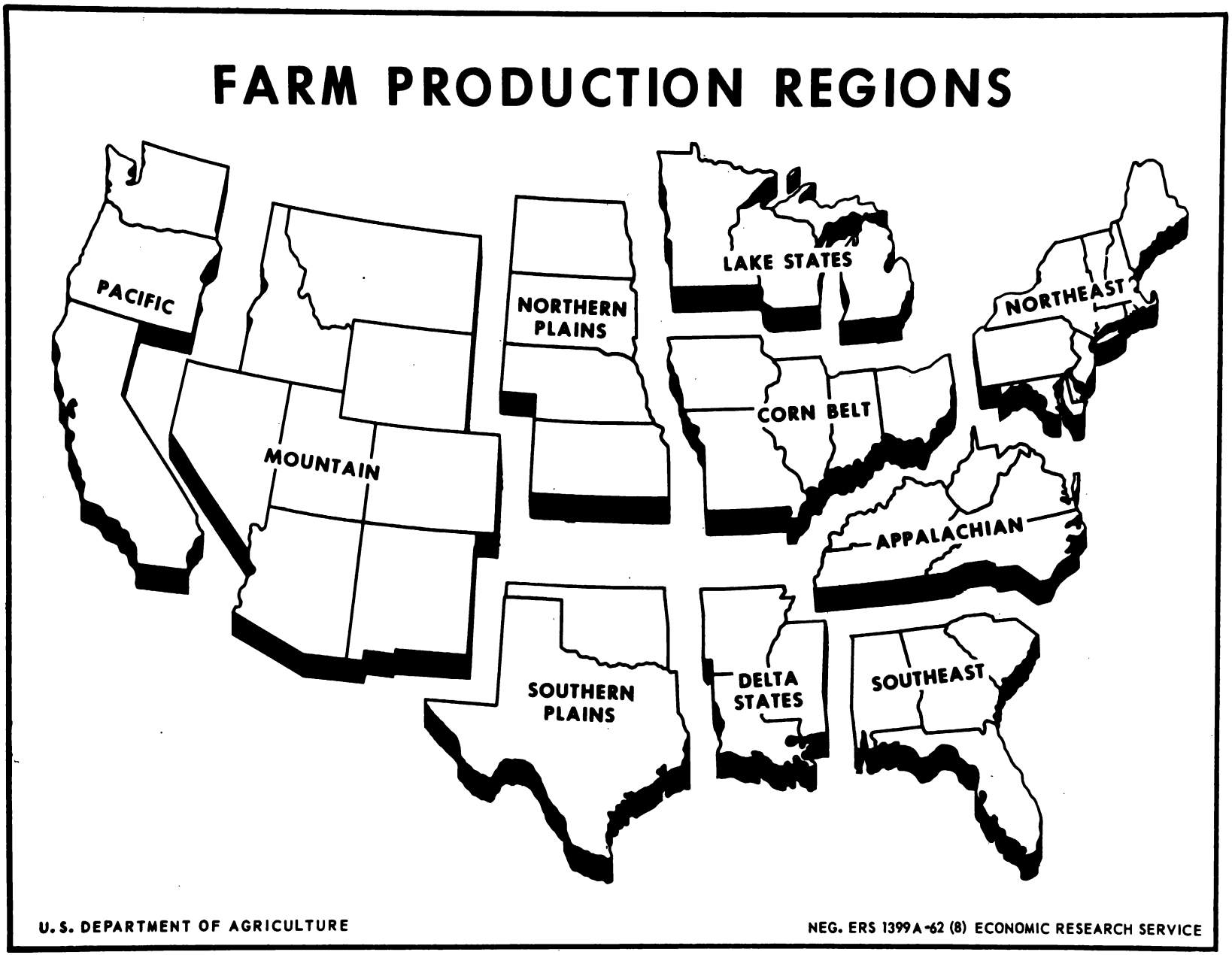
FARM PRODUCTION REGIONS
PACIFIC
MOUNTAIN
NORTHERN PLAINS
LAKE STATES
CORN BELT
NORTHEAST
APPALACHIAN
SOUTHERN PLAINS
DELTA STATES
SOUTHEAST
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Figure 1

The ERS production regions discussed in this report and the States each contains are shown in figure 2. Crops included in the grouped categories are shown in the Appendix, as are total acres of each crop grown in each region.

Pesticide usage discussed in this report is associated with crops planted for harvest in 1971. Thus, fall seedings from the previous year are included. Pesticides used in treating seed, stored crops, storage buildings, farmyards, gardens, idle cropland, fence rows, irrigation ditches, roadbanks, or any other noncropland are not included in this report.

CHANGES IN PESTICIDE USE ON CROPS, 1966-71

Pesticide use by farmers rose substantially between 1966 and 1971. The share of cropland acreage (including pasture) treated with pesticides increased from 36 percent in 1966 to over 50 percent in 1971. Total acres treated with herbicides, insecticides, and fungicides all went up, but the increase in acres treated with herbicides was especially noticeable--from 98 million in 1966 to 158 million in 1971 (table 1). 1/ Acres treated with insecticides rose 14 million while those treated with fungicides increased 3 million.

In both 1966 and 1971, corn led all other crops in the number of acres treated with herbicides. In 1971, corn's share was 58 million acres, or about 37 percent of all crop acreage treated to control weeds. Together, corn and soybeans accounted for over half the crop acres treated for weed control with herbicides. However, during the period, soybeans replaced wheat as the crop with the second largest acreage on which herbicides were used. Cotton and sorghum also became relatively more important users (table 1). Herbicides were used extensively on these two crops as well as on wheat and other grains.

In 1971 corn also led in crop acres treated with insecticides--over 35 percent of the total. Corn, sorghum, and cotton represented about 63 percent of all crop acres treated for insect control.

Insecticide use has increased substantially on several crops considered relatively unimportant users of this type of pesticide. Although numbers remain small, wheat acres treated with insecticides tripled from 1966 to 1971 and soybean acres doubled. Sorghum acres treated went from 330,000 acres in 1966 to 8.1 million acres in 1971.

Crops that have been receiving insecticides the longest--fruits and vegetables--experienced modest changes in acres treated. Probably changes in acres grown and infestation levels influence insecticide use on these crops more than does a general trend in greater use of insecticides.

More use of fungicides by peanut growers accounted for about 26 percent of the upswing in acres treated with this type of pesticide. Fruit and vegetable growers, traditional users of fungicides, employed less--70 percent of all acres treated with fungicides in 1966 down to 37 percent in 1971.

1/ Tables are grouped at the end of the report, starting on page 9.

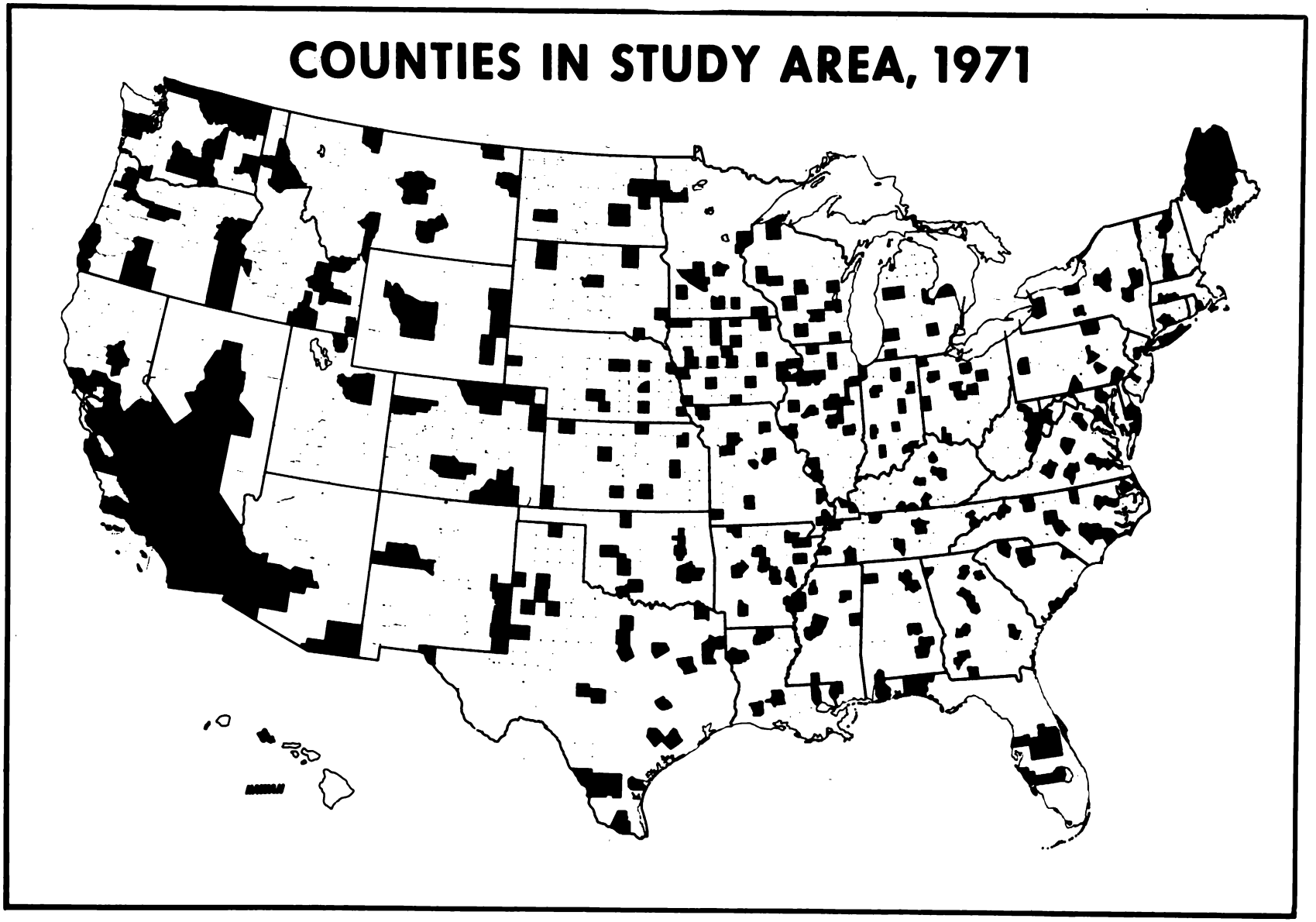

Figure 2

EXTENT OF PESTICIDE USE ON CROPS, 1971

The large proportion of farms using pesticides on crops (over 50 percent) and the large share of acreage in major crops treated with pesticides reflect the substantial growth in pesticide use during the last two decades. A great number of crop acres are receiving herbicide treatment, and untreated acres are becoming a smaller part of acres planted. For example, herbicides are used on 82 percent of the cotton acreage, about 80 percent of corn acres, and 95 percent of rice acreage. This extensive coverage of crop acres with herbicides and the modest growth in fungicide and insecticide use indicates that, for certain crops, numbers of acres treated with pesticides are beginning to level off. However, pesticide use will continue to grow because more pesticides are being used per acre treated.

Herbicides

Herbicides (weed control chemicals) are used primarily as a substitute for labor and equipment in mechanical cultivation. Use has increased rapidly in the last 15 to 20 years. About 45 percent of the farmers used herbicides in 1971 on 41 percent of their crop acres (not including pasture and rangeland) (tables 2 and 3).

The proportion of farmers using herbicides and the percentage of acres treated varied by crop, production region, and size of farm operation. For example, the share of farmers using herbicides on crops ranged from about 1 percent for hay to 91 percent for rice (table 2). Generally, more farmers reported treatments on row crops. Fewer used herbicides on hay, pasture, and most fruits.

Acreage treated with herbicides ranged from about 1 percent for hay and pasture to 95 percent of rice. Herbicides were applied to more than 75 percent of the cotton, corn, rice, and peanut acres (table 4). More than half the soybean, sugar beet, and Irish potato acreage were also treated for weed control. Tobacco, hay, pasture, citrus, other deciduous fruits, and summerfallow were the only crops where less than 25 percent of the acreage was treated.

By region, the proportion of cropland (not including pasture and rangeland) treated varied from 29 percent in the Southern Plains to 62 percent in the Corn Belt. Generally, a higher proportion of a specific crop is treated in the regions where it is grown most extensively and where weather conditions are favorable to weeds. For example, weed control chemicals are used on 12 percent of the corn in the Southern Plains; there, corn is not a primary crop. However, in the major production areas--Corn Belt and Lake States--over 85 percent of the corn is treated for weed control. About half or less of the cotton acres are treated with herbicides in the Pacific and Mountain regions, compared with almost all cotton in the more humid Delta, Southeast, and Appalachian regions. Herbicides are used on about 70 percent of the wheat acres in Lake States, Mountain, and Pacific regions, where weeds are a problem and herbicides are required for control. In other regions, where weeds are less of a problem, fewer herbicides are used. For example, in the Northern Plains, where large acreages of winter wheat are grown, about 50 percent are treated with herbicides. In the remaining regions where wheat is grown, less than 5 percent of the wheat receives herbicide treatment.

Differences in herbicides use between geographic areas largely stemmed from differences in crops grown. In the Lake States and Northern Plains, where corn and small grains are grown, almost 70 percent of the farmers used herbicides (table 5). In the Southern Plains, where rangeland is more important and weather conditions less favorable to weed growth in corn, small grains, and other crops; less than 20 percent of the farmers used herbicides. In contrast, over 60 percent of the farmers in the Corn Belt and about 50 percent in the Northeast used them.

Generally, farmers with large operations used more herbicides. Only about 15 percent of those with the smallest farms reported using this type of pesticide, compared with close to 80 percent of farmers with sales over $40,000 a year (table 5).

When farmers are grouped by region or crop, the differences between small and large operations are not as great in terms of the proportion of acres treated (tables 6 and 7). On the smallest farms, herbicides were applied to about 5 percent of the acres. When pasture and rangeland were not included, percentages were higher, ranging from a low of 15 percent for the smallest farms to about 50 percent for the largest farms.

Insecticides

As with herbicides, use of insecticides varied, depending on crops grown, farm location, and farm size. Insecticides have been used to control insects on cotton, tobacco, and most fruit and vegetable crops for many years. More recently, they have been applied more extensively on such crops such as corn and sorghum. Insecticide use in areas where these crops are important tends to be greater than in other areas. Generally, the larger farms treated a greater proportion of their crop acreage with insecticides.

Although over a fourth of the farmers reported using crop insecticides, they applied these to relatively few acres (table 2). Only 6 percent of the crop acres including pasture and rangeland, or about 15 percent of the crop acres not including pasture and rangeland, were treated for insect control (table 8). The Southeast, at 36 percent, had the highest proportion of cropland (not including pasture and rangeland) treated with insecticides. On the other hand, less than 10 percent of the cropland (not including pasture and rangeland) in the Northeast, Northern Plains, and Mountain regions received insecticide treatment.

Insects are a major problem in the production of vegetables, fruits, tobacco, and peanuts. In nearly all the major producing areas, farmers treated most of the citrus, apple, and deciduous fruit acreage with insecticides. Also, they treated a large proportion of the potato acreage, particularly in the Northeast, and of the tobacco and peanut acreage in the Southeast and Appalachian regions.

Insect problems have long been associated with cotton, and more recently, with corn production. Insecticides were used on 60 percent of the cotton and about 35 percent of the corn acres. Generally, a high proportion of cotton land was treated in areas where cotton is important--the Pacific, Delta States, and Southeast regions; the exception is the Southern Plains region. Insecticides were applied on 45 percent of the corn in the Corn Belt and 43 percent in the

Northern Plains, but only 25 percent in the Lake States.

Regional variations in insecticide use were also apparent for some other important field crops. About a fourth of the sorghum acres were treated and insecticides in the Corn Belt, over a third in the Delta States and Northern and Southern Plains, and almost 80 percent in the Southeast. Over 40 percent of soybeans were treated in the Southeast, a fourth in the Southern Plains, less than 15 percent in the Delta States, and only 1 percent in the Corn Belt.

In the Appalachian and Pacific regions, about 36 percent of the farmers used insecticides on their crops, compared with only 15 percent in the Mountain region (table 9). The difference in use reflects the crops grown in the region and the associated insect infestations. In the Pacific region--where cotton, fruit, and vegetables are important--farmers used insecticides in the production of these crops. In the Mountain region, however, the important crops--hay, pasture, and small grains--are often produced without the use of insecticides.

The proportion of farmers using insecticides and the percentage of acres involved increased with size of farm. About 11 percent of all farms with sales of less than $2,500 a year used insecticides, compared with close to 60 percent of those with sales over $40,000 (table 9). The smallest farms treated as little as 4 percent of their acres (not including pasture and rangeland); the largest farms treated over 30 percent (table 10).

Irrespective of the crops grown, large farms generally used insecticides on a higher proportion of their crop acres. For example, 6 percent of the corn received insecticide treatment on the smallest farms, compared with 51 percent for the largest farms (table 11). For other crops, percentages of acres treated with insecticides on the smallest and the largest farms were, respectively, 60 percent and almost 100 percent for tobacco, 68 and 85 percent for peanuts, and no treatment, and 95 percent for potatoes. Chemical control of insects was used on about 55 percent of the cirtus and apple acreage on the smallest farms and almost all such acreage on the largest farms.

Fungicides

The percentage of farmers using fungicides and the share of acres treated are relatively small when all crops and all regions are considered. About 6 percent of the farmers used fungicides to control crop diseases on about 0.8 percent of their acres (including pasture and rangeland), or about 2 percent of the crop acres (tables 2 and 3). Fungicides were used the most extensively on peanuts, fruits, and vegetables.

Farmers treated a much greater proportion of cropland acres with fungicides in the Southeast region compared with other regions. Fourteen percent of the region's cropland acres (not including pasture and rangeland) received fungicide applications, followed by the Delta States, Northeast, and Pacific regions each with about 5 percent (table 12). The Southeast's farmers used fungicides the most on peanut, fruit, and vegetable acreage. In the Northeast, Irish potatoes, other vegetables, and fruits were the important users of fungicides. Delta States farmers used fungicides the most extensively on other deciduous fruits and other fruits and nuts.

Acreage treated for disease control varied for specific crops by region. For example, in the Northeast potato-growing areas, farmers used fungicides on almost all the potato acres, compared with less than 25 percent of the acres in the Mountain States, another important potato-producing area. Most of the apple acreage in the Lake States and Northeast was treated with this type of pesticide, but in the Pacific region, less than 20 percent of the acreage was treated.

Fungicide use also varied by farm size. For all crops in the United States, less than 3 percent of the operators of farms with sales of less than $5,000 reported using fungicides, compared with almost 15 percent of farms with sales of $40,000 or more (table 13). The difference in proportion of acres treated between the smallest and largest farms was greatest in the Northeast, Appalachian, and Southeast regions (table 14).

Fungicide use on individual crops varied by farm size. For example, the percentages of acreage treated on the smallest and the largest farms were, respectively, 20 percent and 86 percent for peanuts, 13 percent and 69 percent for citrus, and 14 percent and 49 percent for other fruits and nuts (table 15).

Nematocides

Just 2 percent of all farmers used nematocides--on less than 1 percent of the cropland (tables 2 and 3). Nematocides were used the most extensively on tobacco. Some 11 percent of tobacco farmers used nematocides on about a fourth of the tobacco acres. Somewhat less than 10 percent of the peanut acres were treated and 5 percent or less of the sugarbeet, Irish potato, vegetable and fruit acres received nematocide applications.

Other Pesticides

Farmers used other pesticides, including defoliants, desiccants, fumigants, miticides, and growth regulators, quite extensively on a few crops. However, less than 1 percent of all crop acreage was treated with these products by only 10 percent of all farmers (tables 2 and 3).

A large proportion--85 percent--of the tobacco acreage was treated with these miscellaneous pesticides, mostly plant growth regulators for sucker control. Some were also applied to a large share of the citrus and apple acreage, primarily to control fruit setting and to use as harvest aids. Most of the citrus acreage treated was in the Southeast region and over half the apple acreage involved was in the Pacific region.

Miscellaneous pesticides, mostly desiccants and defoliants, were used on about a third of the cotton acres. They were used in almost all regions growing cotton, but the most extensively in the Southeast and Delta States regions.

Table 1--Acres of crops grown and acres treated by type of pest control, by crops, 1966 and 1971 1/

Crop	1966				1971			
	Acres grown 2/	Acres treated with--			Acres grown 3/	Acres treated with--		
		Herbicides	Insecticides	Fungicides		Herbicides	Insecticides	Fungicides
		1,000 acres				1,000 acres		
Corn	66,255	37,765	21,864	4/	74,055	58,503	20,476	741
Cotton	10,349	5,381	5,588	207	12,355	10,131	7,537	494
Wheat	54,513	15,264	1,090	4/	53,810	22,062	3,767	--
Sorghum	16,439	4,932	329	--	20,756	9,548	8,095	4/
Rice	1,980	1,030	198	--	1,826	1,735	639	--
Other grain 5/	35,635	10,334	356	--	37,918	11,755	1,138	379
Soybeans	37,388	10,095	1,496	4/	43,472	29,561	3,478	869
Tobacco	973	19	788	68	839	59	645	59
Peanuts	1,490	939	1,043	522	1,529	1,407	1,330	1,300
Sugarbeets	1,223	404	147	122	1,404	1,053	421	183
Other field crops 5/	8,607	3,185	861	86	6,189	2,476	805	62
Alfalfa	29,008	4/	2,031	--	27,539	275	2,203	4/
Other hay and forage 5/	35,796	358	4/	--	33,866	339	4/	--
Pasture	6/544,512	5,445	4/	--	7/563,314	5,633	--	--
Irish potatoes	1,497	883	1,332	359	1,432	730	1,103	702
Other vegetables 5/	3,690	1,033	2,066	738	6/3,333	1,333	1,866	600
Cirtus	6/1,179	342	1,144	861	6/1,179	259	1,038	684
Apples	6/675	108	621	486	7/ 524	183	477	351
Other deciduous fruits 5/	6/800	104	576	464	7/ 745	142	648	402
Other fruits and nuts 5/	6/1,807	325	1,066	705	7/1,701	578	1,208	782
Summerfallow	36,984	740	--	--	44,463	889	--	--
Total	890,800	98,686	42,596	4,618	932,249	158,651	65,874	7,608

-- = Crops not treated.

1/ Does not include Alaska.

2/ Estimate based on Crop Production, U.S. Dept. Agr., Stat. Rptg. Serv., Cr Pr 2-2, July 1967.

3/ Estimate based on Crop Production, U.S. Dept. Agr., Stat. Rptg. Serv., Cr Pr 2-1 (73), January 1973 and Cr Pr 2-2 (8-73), August 1973.

4/ Less than 0.5 percent of acres grown.

5/ Crops included in this category are listed in Appendix.

6/ Estimate based on 1964 Census of Agriculture.

7/ Estimate based on 1969 Census of Agriculture.

Table 2--Farmers growing crops in 1969 and reporting pesticide use in 1971, by type of pest control and crop 1/

Crop	Farmers growing crops 3/	Farmers reporting pesticide use to control--2/				
		Weeds	Insects	Diseases	Nematodes	Other 4/
	1,000	Percent				
Corn	1,085	67	19	1	5/	5/
Cotton	200	79	52	2	5/	27
Wheat	584	20	3	5/	--	5/
Sorghum	183	41	25	5/	--	5/
Rice	9	91	17	--	--	1
Other grain 6/	621	18	3	5/	--	5/
Soybeans	530	61	4	5/	--	5/
Tobacco	276	8	63	4	11	78
Peanuts	48	81	74	68	6	5/
Sugarbeets	18	81	23	7	5	--
Other field crops 6/	150	26	8	1	5/	1
Alfalfa	639	2	6	5/	--	5/
Other hay 6/	860	1	1	--	--	5/
Pasture	1,924	5	5/	--	--	5/
Irish potatoes	92	36	64	44	2	14
Other vegetables 6/	101	29	53	24	3	5/
Cirtus	29	21	63	36	1	42
Apples	31	20	82	55	3	19
Other deciduous fruits 6/	30	14	81	53	2	8
Other fruits and nuts 6/	62	33	42	36	3	2
Summerfallow	290	4	--	--	--	--
All crops (including pasture)	2,730	45	26	6	2	10

-- = None reported.

1/ Does not include Alaska. Excludes farmers reporting pesticides used for seed treatment and stored crops, and in farmyards and gardens.

2/ Farmers using pesticides on specified crops as a percentage of farms growing that crop.

3/ Estimate and distribution are based on 1969 Census of Agriculture and survey results.

4/ Other pesticides include defoliants, desiccants, growth regulators, miticides, and rodenticides.

5/ Less than 0.5 percent.

6/ Crops included in this category are listed in Appendix.

Table 3--Acres of crops grown and treated with pesticides, by type of pest control and crop, 1971 1/

Crop	Acres grown 2/	Acres on which pesticides were used to control--				
		Weeds	Insects	Diseases	Nematocides	Other 3/
	1,000	Percent				
Corn	74,055	79	35	1	1	4/
Cotton	12,355	82	61	4	4/	36
Wheat	53,810	41	7	--	--	--
Sorghum	20,756	46	39	4/	--	--
Rice	1,826	95	35	--	--	4/
Other grain 5/	37,918	31	3	4/	--	4/
Soybeans	43,472	68	8	2	--	4/
Tobacco	839	7	77	7	26	85
Peanuts	1,529	92	87	85	8	4/
Sugarbeets	1,404	75	30	13	2	--
Other field crops 5/	6,189	40	13	1	4/	1
Alfalfa	27,539	1	8	4/	--	4/
Other hay 5/	33,866	1	4/	--	--	4/
Pasture	6/563,314	1	--	--	--	4/
Irish potatoes	1,432	51	77	49	5	17
Other vegetables 5/	3,333	40	56	18	4	4/
Citrus	7/1,179	22	88	58	4/	66
Apples	6/524	35	91	67	4/	26
Other deciduous fruits 5/	6/745	19	87	54	4/	5
Other fruits and nuts 5/	6/1,701	34	71	46	4	3
Summerfallow	44,463	2	--	--	--	--
All crops (not including pasture)	368,935	41	15	2.0	.4	1.3
All crops (including pasture)	932,249	17	6	.8	.1	.8

-- = None reported.
1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and, in farmyards and gardens.
2/ Estimate based on Crop Production, U. S. Dept. Agr. Stat. Rptg. Serv., Cr Pr 2-1 (73), January 1973 and Cr Pr- (8-73), August 1973.
3/ Other pesticides include defoliants, desiccants, growth regulators, miticides, and rodenticides.
4/ Less than 0.5 percent.
5/ Crops included in the category are listed in Appendix.
6/ Estimate based on 1969 Census of Agriculture.
7/ Estimate based on 1964 Census of Agriculture.

Table 4--Crop acres on which herbicides were used, by region and crop, 1971 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	North-ern Plains	South-ern Plains	Moun-tain	Pacific	United States
					Percent						
Corn	86	73	32	59	87	92	70	12	48	34	79
Cotton	--	100	99	99	98	--	--	73	38	53	82
Wheat	3/	1	4	--	3/	71	48	3	68	67	41
Sorghum	14	50	13	54	58	--	59	39	24	11	46
Rice	--	--	--	94	--	--	--	100	--	95	95
Other grain 2/	26	--	1	--	3	46	45	1	49	35	31
Soybeans	52	55	45	63	77	71	56	39	--	--	68
Tobacco	1	7	12	--	2	--	--	--	--	--	7
Peanuts	--	83	99	93	--	--	--	88	48	--	92
Sugarbeets	--	--	--	--	100	67	89	--	65	80	75
Other field crops 2/	27	6	51	39	37	70	30	3/	35	46	40
Alfalfa	2	1	--	--	3/	3/	--	1	1	7	1
Other hay 2/	3/	1	3	1	--	--	3/	2	3/	5	1
Pasture	3/	1	1	3	1	1	3	2	3/	1	1
Irish potatoes	93	--	77	--	--	39	1	100	38	70	51
Other vegetables 2/	45	31	5	77	65	45	4	12	28	52	40
Citrus	--	--	11	--	--	--	--	--	57	66	22
Apples	33	2	89	--	71	--	--	--	12	72	35
Other deciduous fruits 2/	28	--	37	94	33	4	--	--	--	20	19
Other fruits and nuts 2/	84	17	8	--	100	48	--	--	99	39	34
Summerfallow	--	3/	12	--	3	3	2	1	3	3	2
All crops (not including pasture)	32	36	37	59	62	51	36	30	29	33	41
All crops (including pasture)	22	18	17	35	47	43	20	6	5	11	17

-- = Herbicide not used.

1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are listed in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

Table 5--Farmers using herbicides on crops, by value of sales and region, 1971 1/

Region	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
	Percent							
Northeast	26	73	58	64	80	77	89	53
Appalachian	10	27	58	54	84	76	79	26
Southeast	7	21	24	46	63	67	64	23
Delta States	10	45	37	66	65	72	69	32
Corn Belt	27	49	73	80	88	94	85	66
Lake States	29	63	64	87	97	98	82	69
Northern Plains	20	41	59	75	80	90	92	68
Southern Plains	3	3	24	34	51	46	54	17
Mountain	20	34	33	52	57	61	44	41
Pacific	13	33	46	57	49	49	62	35
All regions	15	36	54	68	80	80	74	45

1/ Does not include Alaska. Excludes farmers reporting pesticides used for seed treatment and stored crops, and in farmyards and gardens. Crops included and acres grown are shown in Appendix.

Table 6--Crop acres on which herbicides were used, by value of sales and region, 1971 1/

Region 2/	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
	Percent							
Northeast	5	19	25	14	23	34	36	22
Appalachian	3	8	13	21	32	35	40	18
Southeast	3	8	7	8	24	26	19	17
Delta States	2	11	12	31	38	51	55	35
Corn Belt	12	19	31	40	49	62	58	47
Lake States	11	24	30	39	49	58	74	43
Northern Plains	25	11	16	20	17	25	18	20
Southern Plains	1	1	4	6	11	10	2	6
Mountain	3	5	6	9	7	6	2	5
Pacific	2	10	8	5	11	13	13	11
All regions (not including pasture)	15	24	29	38	42	51	48	41
All regions (including pasture)	5	8	14	18	21	23	12	17

1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Crops included and acres grown are shown in Appendix.

2/ Includes pasture and rangeland unless otherwise specified.

Table 7--Crop acres on which herbicides were used, by value of sales and crop, 1971 1/

Crop	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
				Percent				
Corn	41	61	65	76	83	85	85	79
Cotton	66	72	62	95	80	86	79	82
Wheat	45	25	36	44	39	48	31	41
Sorghum	5	27	28	38	43	56	62	46
Rice	100	--	100	85	98	96	97	95
Other grain 2/	8	14	31	29	32	40	26	31
Soybeans	25	40	49	57	68	80	81	68
Tobacco	6	2	4	4	5	29	--	7
Peanuts	68	4	97	80	98	95	100	92
Sugarbeets	--	38	84	76	84	67	77	75
Other field crops 2/	1	20	48	30	44	49	51	40
Alfalfa	1	2	3/	1	1	2	2	1
Other hay 2/	1	1	3/	3/	1	1	3	1
Pasture	1	1	1	1	2	1	3/	1
Irish potatoes	--	--	14	11	51	50	67	51
Other vegetables 2/	46	39	12	28	41	47	43	40
Citrus	12	4	20	16	30	33	23	22
Apples	43	--	1	65	35	52	36	35
Other deciduous fruits 2/	1	6	1	12	18	25	37	19
Other fruits and nuts 2/	27	6	37	26	54	28	47	34
Summerfallow	1	1	3/	3	4	3	3/	2
All crops (not including pasture)	15	24	29	38	42	51	48	41
All crops (including pasture)	5	8	14	18	21	23	12	17

-- = Herbicides not used.

1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are shown in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

Table 8--Crop acres on which insecticides were used, by region and crop, 1971 1/

Crop	Northeast	Appalachian	Southeast	Delta States	Corn Belt	Lake States	Northern Plains	Southern Plains	Mountain	Pacific	United States
	Percent										
Corn	9	9	1	4	45	25	43	6	39	19	35
Cotton	--	46	81	86	54	--	--	41	72	89	61
Wheat	3/	1	--	8	--	--	1	35	1	7	7
Sorghum	--	12	79	36	24	--	37	42	40	79	39
Rice	--	--	--	8	--	--	--	71	--	70	35
Other grain 2/	5	1	3/	11	2	2	--	22	3/	2	3
Soybeans	7	14	44	14	1	--	--	24	--	--	8
Tobacco	18	80	100	--	7	--	--	--	--	--	77
Peanuts	--	95	94	82	--	--	--	70	--	--	87
Sugarbeets	--	--	--	--	14	1	7	--	29	56	30
Other field crops 2/	5	--	36	40	5	3	3	3/	27	26	13
Alfalfa	6	44	--	54	10	3	3/	12	9	29	8
Other hay 2/	3/	--	3/	--	1	3/	--	1	--	3/	3/
Pasture	--	--	3/	--	--	3/	--	3/	--	--	--
Irish potatoes	97	55	100	--	--	75	87	100	65	65	77
Other vegetables 2/	37	52	57	95	66	34	--	61	72	72	56
Citrus	--	--	88	--	--	--	--	93	100	85	88
Apples	96	71	89	--	100	98	97	--	66	96	91
Other deciduous fruits 2/	98	100	86	62	33	100	100	93	70	86	87
Other fruits and nuts 2/	79	35	60	100	--	89	100	98	99	65	71
Summerfallow	--	--	--	--	--	--	--	--	--	--	--
All crops (not including pasture)	9	12	36	26	22	11	9	29	7	23	15
All crops (including pasture)	7	7	16	15	17	9	5	6	1	7	6

-- = Insecticides not used.

1/ Does not include Alaska. Includes fumigants used to treat soil organisms. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are listed in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

Table 9--Farmers using insecticides on crops, by value of sales and region, 1971 1/

Region	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,000	$40,000 to $99,999	$100,000 and over	All farmers
				Percent				
Northeast	11	14	24	15	31	52	41	21
Appalachian	20	45	60	77	71	62	64	36
Southeast	7	18	55	69	44	67	63	25
Delta States	14	13	5	31	50	42	64	21
Corn Belt	3	11	17	26	43	65	70	27
Lake States	7	14	10	20	36	50	45	20
Northern Plains	3	14	10	28	33	46	60	27
Southern Plains	4	16	16	37	46	49	42	19
Mountain	1	8	9	15	28	28	43	15
Pacific	12	33	47	55	52	50	71	36
All regions	11	21	24	34	42	55	60	26

1/ Does not include Alaska. Excludes farmers reporting pesticides used for seed treatment and stored crops, and in farmyards and gardens. Includes fumigants used to treat soil organisms. Crops included and acres grown are shown in Appendix.

Table 10--Crop acres on which insecticides were used, by value of sales and region, 1971 1/

Region 2/	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
	Percent							
Northeast	1	1	10	2	6	15	11	7
Appalachian	1	2	3	10	10	14	21	7
Southeast	2	9	8	9	24	20	26	16
Delta States	2	3	1	9	21	19	28	15
Corn Belt	2	2	6	7	16	26	31	17
Lake States	4	2	2	5	8	16	39	9
Northern Plains	1	2	2	3	4	8	9	5
Southern Plains	1	3	6	6	9	10	3	6
Mountain	3/	3/	1	1	1	1	2	1
Pacific	2	6	3	2	6	5	14	7
All regions (not including pasture)	4	8	8	9	14	22	32	15
All regions (including pasture)	1	3	3	4	7	10	8	6

1/ Does not include Alaska. Includes fumigants used to treat soil organisms. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Crops included and acres grown are shown in Appendix.

2/ Includes pasture and rangeland unless otherwise specified.

3/ Less than 0.5 percent.

Table 11--Crop acres on which insecticides were used, by value of sales and crop, 1971 1/

Crop	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
	Percent							
Corn	6	8	13	20	32	46	51	35
Cotton	54	42	27	55	46	64	89	61
Wheat	--	10	7	5	7	7	7	7
Sorghum	1	5	20	27	37	53	56	39
Rice	--	--	--	--	15	28	58	35
Other grain 2/	1	6	4	2	4	2	8	3
Soybeans	8	3	3/	3	6	8	21	8
Tobacco	60	55	65	79	95	79	99	77
Peanuts	68	17	66	70	84	96	85	87
Sugarbeets	--	--	--	18	36	29	31	30
Other field crops 2/	3/	11	4	6	14	14	32	13
Alfalfa	2	5	1	3	4	12	21	8
Other hay 2/	3/	--	1	3/	1	3/	3/	3/
Pasture	--	3/	--	--	--	3/	--	--
Irish potatoes	--	9	21	21	79	76	95	77
Other vegetables 2/	27	19	59	34	56	45	75	56
Citrus	54	60	90	97	50	81	99	88
Apples	59	94	74	95	88	100	99	91
Other deciduous fruits 2/	81	86	81	84	92	94	88	87
Other fruits and nuts 2/	12	75	65	64	77	67	85	71
Summerfallow	--	--	--	--	--	--	--	--
All crops (not including pasture)	4	8	8	9	14	22	32	15
All crops (including pasture)	1	3	3	4	7	10	8	6

-- = Insecticides not used.

1/ Does not include Alaska. Includes fumigants used to treat soil organisms. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are shown in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

Table 12--Crop acres on which fungicides were used, by region and crop, 1971 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	North-ern Plains	South-ern Plains	Moun-tain	Pacific	United States
					Percent						
Corn	1	2	--	--	2	1	1	3/	--	1	1
Cotton	--	--	3	3	--	--	--	1	36	16	4
Wheat	--	1	--	--	3/	--	--	--	--	--	--
Sorghum	--	--	1	--	1	--	--	3/	1	--	3/
Rice	--	--	--	--	--	--	--	--	--	--	--
Other grain 2/	1	--	--	--	3/	--	3/	--	--	--	3/
Soybeans	--	2	3/	8	3/	--	--	--	--	--	2
Tobacco	1	3	25	--	--	--	--	--	--	--	7
Peanuts	--	94	97	18	--	--	--	60	--	--	85
Sugarbeets	--	--	--	--	39	11	43	--	1	11	13
Other field crops 2/	5	--	--	--	1	--	--	--	3	1	1
Alfalfa	--	--	--	--	3/	--	--	--	3/	--	3/
Other hay 2/	--	--	--	--	--	--	--	--	3/	--	--
Pasture	--	--	--	--	--	--	--	--	--	--	--
Irish potatoes	96	49	100	--	--	61	47	100	23	8	49
Other vegetables 2/	12	24	41	8	55	3	--	15	5	16	18
Citrus	--	--	70	--	--	--	--	--	--	30	58
Apples	85	70	89	--	99	98	93	--	12	19	67
Other deciduous fruits 2/	77	100	86	100	33	100	100	--	--	37	54
Other fruits and nuts 2/	75	47	71	79	54	46	--	9	99	41	46
Summerfallow	--	--	--	--	--	--	--	--	--	--	--
All crops (not including pasture)	4.7	2.9	14.2	4.9	1.2	1.1	3/	1.0	1.2	4.7	2.0
All crops (including pasture)	3.2	1.5	6.3	2.8	0.9	0.9	3/	3/	3/	1.5	0.8

-- = Fungicides not used.

1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are listed in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

Table 13--Farmers using fungicides on crops, by value of sales and region, 1971 1/

Region	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
				Percent				
Northeast	7	15	21	17	15	22	21	13
Appalachian	3	6	22	11	17	23	27	7
Southeast	1	9	18	33	28	60	49	14
Delta States	--	--	--	2	2	8	7	1
Corn Belt	1	1	1	2	4	5	4	3
Lake States	3	2	--	3	1	5	12	2
Northern Plains	--	1	--	--	2	1	4	1
Southern Plains	--	--	2/	7	12	6	--	2
Mountain	1	--	4	2	2	4	14	3
Pacific	7	12	24	30	23	26	30	18
All regions	2	3	7	7	7	14	15	6

-- = Fungicides not used.

1/ Does not include Alaska. Excludes farmers reporting pesticides used for seed treatment and stored crops, and in farmyards and gardens. Crops included and acres grown are shown in Appendix.

2/ Less than 0.5 percent.

Table 14--Crop acres on which fungicides were used, by value of sales and region, 1971 1/

Region 2/	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
				Percent				
Northeast	0.1	0.5	7.5	0.9	2.2	7.3	6.4	3.2
Appalachian	0.1	0.3	1.3	0.7	2.3	4.2	4.9	1.5
Southeast	0.1	1.9	3.7	3.6	4.2	8.8	11.8	6.3
Delta States	--	--	--	1.6	0.8	9.8	1.4	2.8
Corn Belt	0.5	--	0.4	0.7	0.8	1.5	0.7	0.9
Lake States	3.2	0.1	--	0.2	0.2	1.3	6.5	0.9
Northern Plains	--	0.1	--	--	0.2	0.1	0.5	0.1
Southern Plains	--	--	0.1	0.3	0.6	0.3	--	0.2
Mountain	0.1	--	0.2	--	0.1	0.1	0.3	0.2
Pacific	1.0	1.1	1.5	1.0	1.5	1.3	2.1	1.5
All regions (not including pasture)	1.4	0.6	1.1	0.9	1.2	2.9	4.2	2.0
All regions (including pasture)	0.4	0.2	0.5	0.4	0.6	1.3	1.0	0.8

-- = Fungicides not used.

1/ Does not include Alaska. Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Crops included and acres grown are shown in Appendix.

2/ Includes pasture and rangeland unless otherwise specified.

Table 15--Crop acres on which fungicides were used, by value of sales and crop, 1971 1/

Crop	Less than $2,500	$2,500 to $4,999	$5,000 to $9,999	$10,000 to $19,999	$20,000 to $39,999	$40,000 to $99,999	$100,000 and over	All farmers
	Percent							
Corn	2	--	1	1	1	2	3/	1
Cotton	--	--	3/	2	2	2	10	4
Wheat	--	--	--	3/	3/	--	--	--
Sorghum	--	--	1	--	3/	--	3/	3/
Rice	--	--	--	--	--	--	--	--
Other grain 2/	--	--	3/	--	3/	3/	--	3/
Soybeans	1	--	--	--	3/	5	1	2
Tobacco	1	--	2	5	11	17	19	7
Peanuts	20	9	63	50	85	96	86	85
Sugarbeets	--	--	--	--	--	11	21	13
Other field crops 2/	--	--	1	--	3/	1	1	1
Alfalfa	--	--	--	--	3/	3/	--	3/
Other hay 2/	--	--	--	--	3/	--	--	--
Pasture	--	--	--	--	--	--	--	--
Irish potatoes	--	55	12	30	39	49	73	49
Other vegetables 2/	3	6	2	10	14	20	26	18
Citrus	13	29	42	82	41	42	69	58
Apples	55	83	47	65	46	91	70	67
Other deciduous fruits 2/	70	9	61	68	49	61	46	54
Other fruits and nuts 2/	14	14	58	55	59	58	49	46
Summerfallow	--	--	--	--	--	--	--	--
All crops (not including pasture)	1.4	0.6	1.1	0.9	1.2	2.9	4.2	2.0
All crops (including pasture)	0.4	0.2	0.5	0.4	0.6	1.3	1.0	0.8

-- = Fungicides not used.

1/ Excludes pesticides used for seed treatment and stored crops, and in farmyards and gardens. Acres of crops grown are shown in Appendix.

2/ Crops included in this category are listed in Appendix.

3/ Less than 0.5 percent.

APPENDIX

Crops Included in Report

INDIVIDUAL CROPS

corn
cotton
wheat
sorghum
rice
soybeans
tobacco
peanuts
sugarbeets
alfalfa
pasture and rangeland
Irish potatoes
citrus
apples
summerfallow

OTHER GRAINS

oats
mixed grains
barley
rye

OTHER HAY

all hay, other than alfalfa

OTHER VEGETABLES

cabbage
carrots
celery
lettuce
onions
tomatoes
watermelons
sweet corn
snap beans
spinach
artichokes
asparagus
broccoli
cauliflower
cucumbers
beets
green peppers
green peas
cranberries
other vegetables

OTHER DECIDUOUS FRUITS

peaches
pears
cherries
apricots
plums
prunes
nectarines

OTHER FRUITS AND NUTS

grapes
avocados
figs
blackberries
blueberries
boysenberries
currants
gooseberries
loganberries
raspberries
strawberries
almonds
filberts
pecans
walnuts
olives
tung nuts

OTHER FIELD CROPS

grass and hayseed
buckwheat
castorbeans
hops
lentils
millet
mung beans
peppermint
spearmint
rutabagas
sesame
spelt
sunflowers
velvetbeans
dry beans
dry field peas
flax
popcorn
broomcorn
cowpeas
sugarcane
sweetpotatoes

Acres of crops grown, by crop and region, 1971 1/

Crop	North-east	Appa-lachian	South-east	Delta States	Corn Belt	Lake States	North-ern Plains	South-ern Plains	Moun-tain	Pacific	United States
						1,000					
Corn	3,559	4,703	3,440	445	35,376	12,059	12,010	819	1,107	537	74,055
Cotton	--	651	1,398	3,045	345	--	--	5,711	445	760	12,355
Wheat	573	1,065	610	531	3,688	2,146	23,846	8,562	8,954	3,835	53,810
Sorghum	--	397	289	604	1,110	--	8,031	8,841	1,165	319	20,756
Rice	--	--	--	1,019	5	--	--	469	--	333	1,826
Other grain 2/	1,633	1,287	1,039	260	5,322	6,508	10,008	4,621	4,405	2,835	37,918
Soybeans	479	3,511	2,621	8,758	22,405	3,470	1,944	284	--	--	43,472
Tobacco	50	626	136	--	16	11	--	--	--	--	839
Peanuts	--	273	806	10	--	--	--	432	8	--	1,529
Sugarbeets	--	--	--	--	42	206	206	23	472	455	1,404
Other field crops 2/	102	213	266	415	614	1,076	1,778	151	665	909	6,189
Alfalfa	2,232	464	9	91	4,130	6,347	6,811	817	4,468	2,170	27,539
Other hay 2/	3,610	4,230	1,364	1,568	4,890	2,170	7,940	3,193	3,380	1,521	33,866
Pasture 3/	6,283	18,126	16,922	13,224	26,203	8,437	78,643	157,078	191,286	47,112	563,314
Irish potatoes	285	58	54	6	28	201	158	26	403	213	1,432
Other vegetables 2/	430	139	434	60	248	645	1	254	164	958	3,333
Citrus 3/	--	--	886	1	--	--	--	32	40	220	1,179
Apples 3/	168	76	6	3	43	80	3	2	20	123	524
Other deciduous fruits 2/ 3/	64	18	65	8	17	102	2	12	21	436	745
Other fruits and nuts 2/ 3/	93	14	210	85	20	40	4	170	25	1,040	1,701
Summerfallow	200	391	262	377	1,154	1,925	21,364	3,977	10,577	4,236	44,463
All crops (not including pasture)	13,478	18,116	13,895	17,286	79,453	36,986	94,106	38,396	36,319	20,900	368,935
All crops (including pasture)	19,761	36,242	30,817	30,510	105,656	45,423	172,749	195,474	227,605	68,012	932,249

-- = Crop not grown.

1/ Does not include Alaska. Acres reported in Crop Production, 1972, U.S. Dept. Agr., Stat. Rptg. Serv., 2-1 (73) January 1973 and Cr Pr 2-2 (8-73), August 1973.

2/ Crops included in this category are listed on previous page.

3/ Estimates based on 1969 Census of Agriculture.

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This publication reports research involving pesticides. It does not contain recommendations for their use, nor does it imply that the uses discussed here have been registered. All uses of pesticides must be registered by appropriate State and/or Federal agencies before they can be recommended.

CAUTION: Pesticides can be injurious to humans, domestic animals, desirable plants, and fish or other wildlife -- if they are not handled or applied properly. Use all pesticides selectively and carefully. Follow recommended practices for the disposal of surplus pesticides and pesticide containers.